Fixed-Point Interface Profiling

Multi-Point Density Array (MDA) Solution for Separation Applications

Looking Forward VEGA

Contents

Leadership in Interface Profiling

VEGA is proud to offer the Multi-Point Density Array (MDA) solution for fixed-point interface profiling measurements. Providing high resolution and an unparalleled method of measuring interfaces, especially those with emulsion layers, the MDA operates reliably in the most difficult of applications.

Why Use the MDA?

The MDA system provides continuous density data at each individual measurement point, specific to each horizontal plane of elevation. As the outputs change from the multiple detectors, the operator can determine the movement of the interface or the size of the emulsion layer for optimal running efficiency of the unit. The density profile created by the MDA system provides actionable data that allows for real-time process monitoring, leading to unit efficiency that is unachievable by other measurement technologies.

The system is low maintenance because all detectors mount on the outside of the vessel and have no direct contact with the process. The detectors are easily accessible for maintenance, and with multiple independent measurement points, one offline detector does not shut down operation of the system. Extensive diagnostics are possible through PACTware®, or other configuration software that support DTM or EDD description technologies.

Main Benefits of the MDA System:

The VEGA MDA system offers many benefits to the end user. These include:

- High energy sources and a longer process path minimize the effects of buildup on source wells and vessel walls.
- High resolution detectors achieve accurate measurement.
- Independent density measurements ensure one detector does not influence the accuracy of another.
- A distributed control system (DCS) algorithm can be used to implement level and density control without requiring a separate computer.
- Compact detectors create a small mounting footprint.
- Externally mounted electronics withstand higher process temperatures.

System Overview

The VEGA MDA system provides the ability to understand the emulsion density characteristics across the span of measurement. Understanding and monitoring these characteristics provides the operator with information that can lead to process optimization of the vessel, resulting in better performance and increased throughput.

Advanced Design & Development

The MDA system provides accurate and repeatable information in emulsion applications where such reliability has been historically difficult to achieve. Taking into consideration the potentially high temperature and pressure conditions and varying emulsion layer that mark some separation processes, the MDA was developed around the non-contact, radiation-based measurement principle. This principle is used to employ multiple, independent density measurement points that provide accurate and repeatable density information across the measurement span of the vessel. The system is customized per application for vessel size and configuration, process characteristics, number of interfaces, and resolution.

Custom Solution Flexibility

Every application is evaluated for unique requirements of the measurement system. The measurement span and resolution determine the number of detectors and the orientation of the array mounted on the outside of the vessel. This array dictates the source holder and source requirements (number, size, location, and construction) normally inserted into a dry well through a flanged interface on the vessel. Dry wells can be straight or curved to meet application needs. They can be supplied by VEGA or provided by the user.

The MDA provides multiple outputs to a DCS for a graphical indication from each detector, which can be combined as appropriate to provide a thickness measurement of various interfaces, or an overall level indication. The inputs to the DCS can also be used to provide a point for the control of the lower high density product. VEGA also offers an optional visualization display.

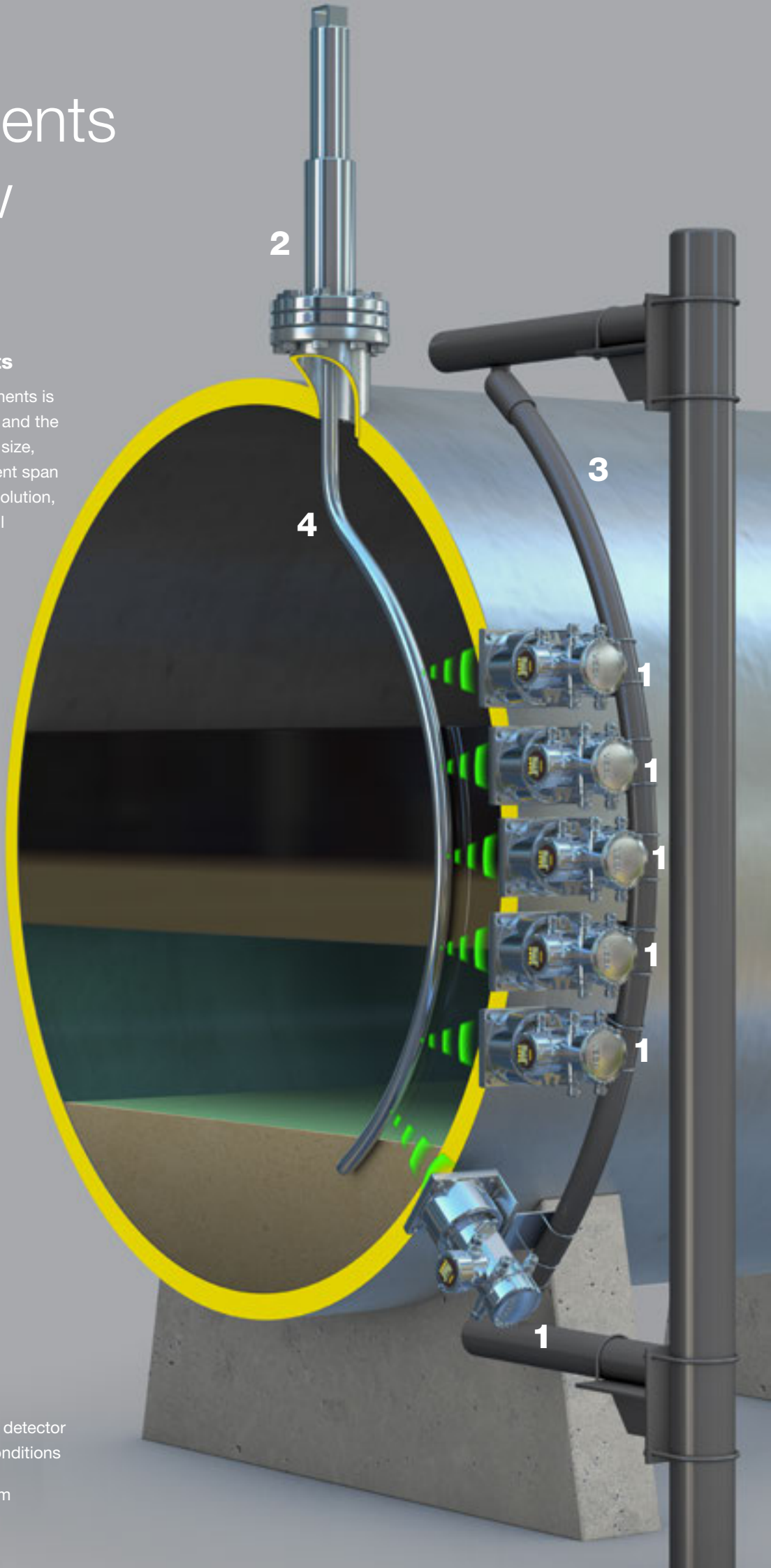
Components Overview

MDA System Components

Selection of these various components is dependent upon each application and the user's measurement need. Vessel size, shape, wall thickness, measurement span of interest, measurement span resolution, and other application variables will determine the number and specification of the individual components of the system.

Four Main Components:

1. MiniTrac 31 radiation-based density detector
2. SHLM source holder
3. Flexible detector mounting bracket system
4. Dry well



Optional Equipment

Visualization display: provides the detector outputs to indicate the process conditions

X-ray interference detection system

Components

MiniTrac 31

The MiniTrac 31 is a compact radiation-based sensor ideal for density measurements. It utilizes a highly sensitive NaI scintillation crystal and features VEGA's ProTrac® family of electronics.

- Measuring Range: Fixed Point
- Ambient Temperature: -40 … +140°F (-40 … +60°C)
- Output signal: 4 … 20 mA/HART, Profibus PA, Foundation Fieldbus
- Enclosure Rating: NEMA 4X, IP 66/67
- Standard Approvals
- Cast aluminum or stainless steel housing
- Communication and calibration provided by PACTware configuration software

SHLM

The SHLM source holder is used for critical applications when the process radiation path is too long for externally mounted sources. The SHLM utilizes a rod or cable assembly to place the sources inside the vessel in a dry well.

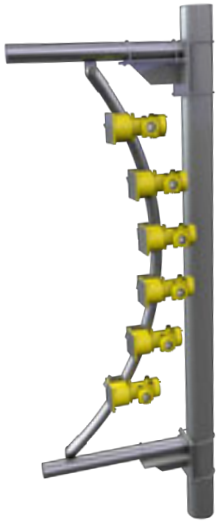
- Source Option: Single point or multi-point
- Multiple source configurations available
- Shutter lockout feature
- For use on high pressure or temperature applications
- Collimated detectors allows for high-resolution density measurement with simple calibration and no external algorithms

Single Point Multi-Point

Flexible Detector Mounting Bracket System

Detectors are mounted on a flexible, stainless steel bracket system that permits the proper location and orientation of the detectors, relative to the sources in the dry well. The bracket system provides adjustment in three planes for ease of installation. Brackets can incorporate a density absorber system for calibration after the initial commissioning.

- Flexible mounting configuration accommodates internal structures in the vessel, such as electrostatic grids
- Customized design of bracket system is specified for each application for ideal mounting configuration, and simplifies customer installation engineering



Optional Components

Dry Well

- Internal vessel dry well, curved or straight, mounts the source holder and contains small sources
- May use existing vessel nozzles for insertion
- Manufactured from various materials for process compatibility
- Non-destructively and hydrostatically tested
- Designed to piping design requirements
- No exotic materials needed
- Each dry well custom engineered for each application

Enhanced visualization cabinet for interface measurement

An optional visualization display locally or remotely displays the detector information. The remotely-mounted system can be configured to provide the measurement outputs back to a DCS system through a single Modbus, 4 … 20 mA, or Ethernet digital signal. The PACTware software provides extensive diagnostics of each detector through a connection with the 4 … 20 mA DC HART® Protocol output signal of each detector.

- Target Densities: upper and lower fluid
- Individual densities in each specific zone of measurement
- Indication of overall vessel levels through individual level calculations

X-ray Detection System

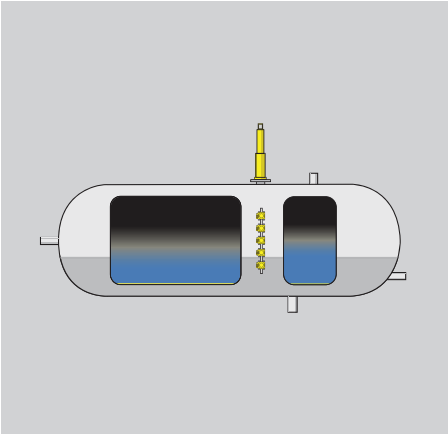
Monitors for radiation from non-destructive testing (NDT)

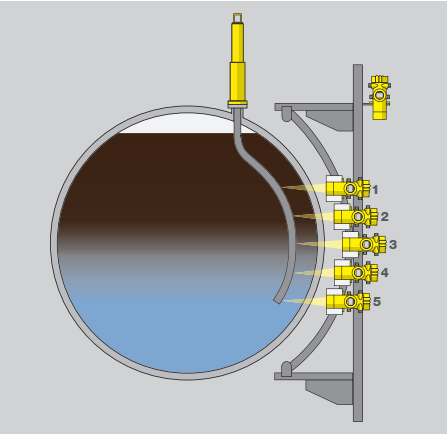
- X-ray detector alerts operator when NDT testing is in the area
- Protects outputs from going to a low value
- Prevents x-ray interference from NDT source

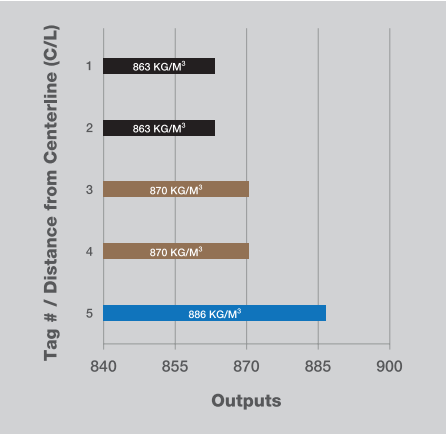
Principle of Operation

A continuous density output is provided from each detector's measurement location, giving the operator information on the true, unaveraged density of the fluid at that horizontal location. As these outputs change on multiple detectors, the movement of the interface or the size of the emulsion layer can be determined.

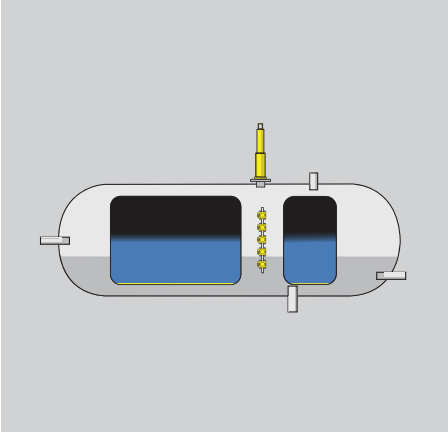
Interface with Emulsion Layer

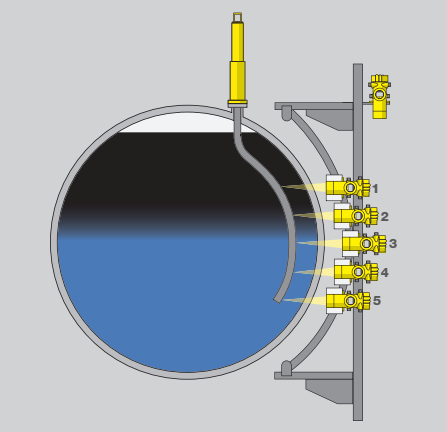


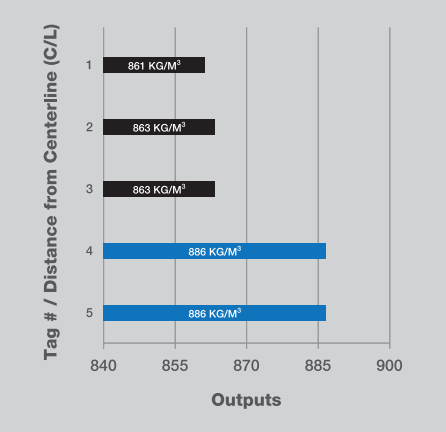




Defined Interface







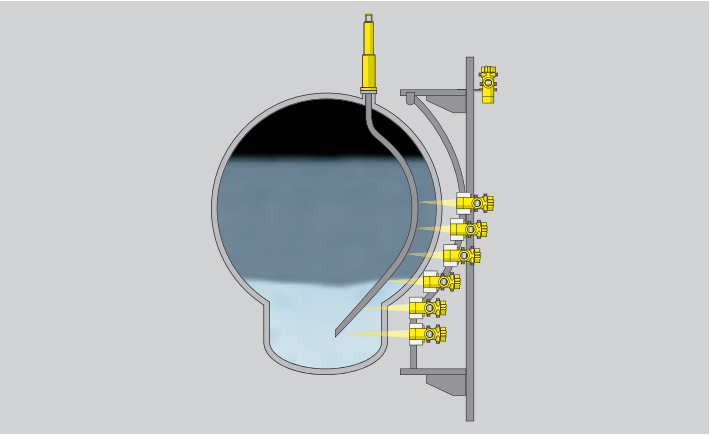
Application Areas

Customized for vessel size and configuration, process characteristics, number of interfaces, and resolution

Processes with smaller vessel dimensions, high temperature, and an emulsion layer of varying thickness are perfect for the VEGA MDA System. These applications include desalters, free water knockout drums, separators, and treaters in the oil and gas industry, where the processing of heavy crude creates more emulsion in these vessels. The MDA is also applicable in other interface applications where emulsions are present.

Technology highlight: Trend Monitoring

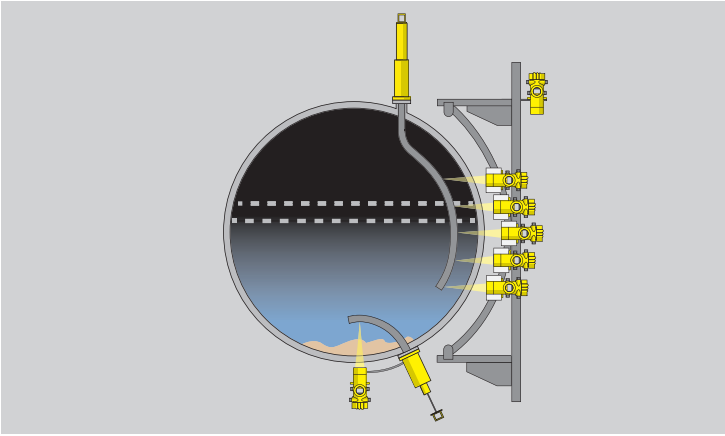
Monitoring the individual outputs from all the detectors enables the operator to see changing conditions inside the vessel. If the outputs are rising (higher specific gravity) the emulsion will be rising higher in the vessel. If the outputs drop (lower specific gravity) the emulsion will be lowering in the vessel. This trending of the outputs enables the operator to adjust their output parameters to reach the optimum performance.



Alky Settler

In an alkylation unit the acid settler is fed from the reactor vessel, which is used to remove acid for recycling back into the reactor. The layers created in the separation process form interfaces that must be tracked to manage the output of the material from the unit. Reporting density on a horizontal plane enables accurate control of the process and maximizes throughput, therefore controlling the acid levels for optimal processing.

- Reduced commission time due to calibration of air and process liquid of a known density
- Fixed density profile system for emulsion interface control
- Customizable detector system tracks multiple interfaces



Desalter

When heavy crude is mixed with chemicals and water in the desalter, an emulsion is created that makes interface tracking difficult for standard technologies. The MDA provides a fixed density profile over the measurement span in the desalter, allowing the unit operator to track the emulsion layer and changing interfaces within the process.

- Tracks emulsion layer to prevent over and under carry
- Remains online even when replacing a detector
- Optional monitoring of sludge buildup with single-point density measurement
- Applicable to free water knockout drums and treaters

plics® – Easy is Better

Instrument Platform plics®: Process Measurement Made to Order

Commercially available standard solutions for measurement do not leave the user much leeway for truly optimal instrumentation. In contrast, the instrument platform plics® provides a variety of configurations, which are chosen based on application requirements. The plics platform allows for the most suitable combination of sensor, electronics, and housing to be created. The result is an instrument that is highly reliable, economical, user friendly, and with short lead times. With sensors that offer reliable measurement using radiation-based technologies, and construction based on the plics principle, VEGA continues to lead the way in solving difficult and important application issues.

How We Earn Your Business

The Right Instrument for Every Application

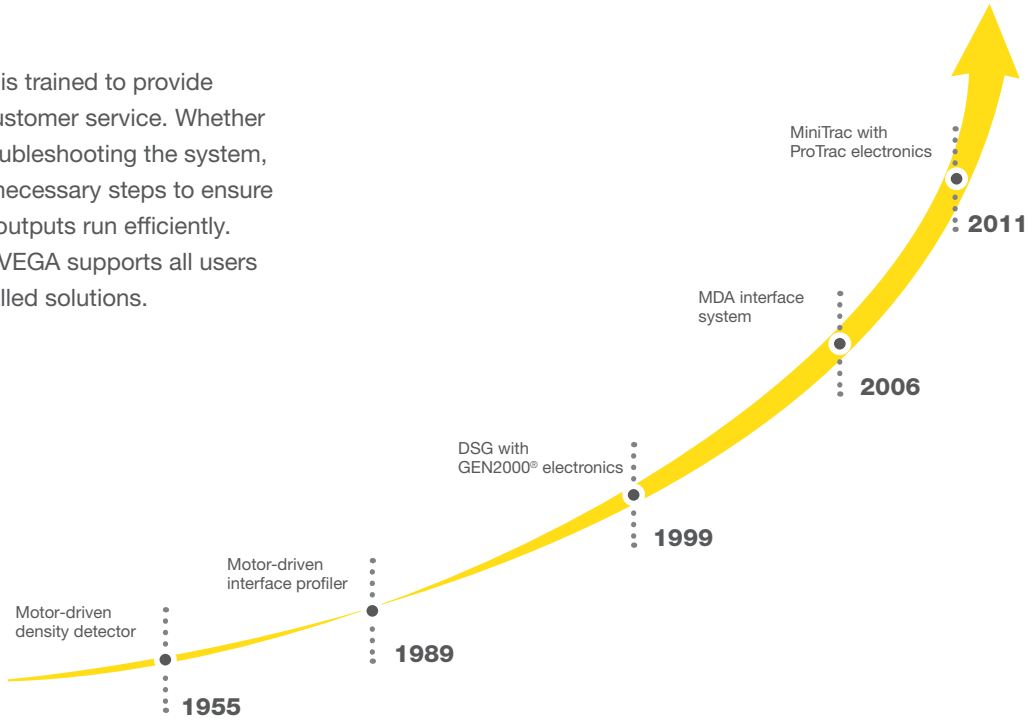
VEGA is committed to supplying instruments that work in all applications, not just those with ideal conditions. All new instruments are tested in extreme heat, dust, chemical, moisture, and cold environments before they are released. VEGA's goal is to enable customers to achieve operational efficiency with every measured process.

Performance Guarantee

To demonstrate our commitment to specifying the right instrument for each application, VEGA Americas offers a Performance Guarantee — if our recommended solution does not perform exactly as expected, we'll make it right.

24 Hour Support

The VEGA Field Service team is trained to provide telephone, email, or on-site customer service. Whether starting up, configuring, or troubleshooting the system, VEGA Field Service provides necessary steps to ensure the measuring device and its outputs run efficiently. Through service and training, VEGA supports all users throughout the life of the installed solutions.



Terminals

Removable

Electronics

4 … 20 mA/ HART

Profibus PA

Foundation Fieldbus

Housing

Aluminum double chamber

Stainless steel double chamber

Indicating & Adjustment Module

PLICSCOM

VEGACONNECT

DTM

Sensors

NaI crystal

SIL Safety standards Ship approvals Ex Explosion protection Hyg Hygienic standards

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Looking Forward

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